

[0028] FIG. 9 is an exploded perspective view of a rotary-type hinge module of a portable wireless terminal according to a third preferred embodiment of the present invention;

[0029] FIG. 10 is a perspective view of the rotary-type hinge module shown in FIG. 9;

[0030] FIG. 11 is a perspective view of the hinge housing employed in the rotary-type hinge module shown in FIG. 9;

[0031] FIG. 12 is a perspective view of the rotary shaft employed in the rotary-type hinge module shown in FIG. 9;

[0032] FIG. 13 is an exploded perspective view of a folder housing with which the rotary-type hinge module shown in FIG. 9 is assembled;

[0033] FIG. 14 is a partial sectional view of a portable wireless terminal with which the rotary-type hinge module shown in FIG. 9 is assembled;

[0034] FIG. 15 is an exploded perspective view of a rotary-type hinge module of a portable wireless terminal according to a fourth embodiment of the present invention;

[0035] FIG. 16 is a sectional view of the rotary-type hinge module shown in FIG. 15;

[0036] FIG. 17 is a perspective view of a portable wireless terminal employing the rotary-type hinge module according to the present invention, which is in a phone mode;

[0037] FIG. 18 is a perspective view of the portable wireless terminal shown in FIG. 17, which is in a PDA mode;

[0038] FIG. 19 is a view showing the operation of switching modes of the folder of the portable wireless terminal by turning over the front and rear surfaces of the folder; and

[0039] FIG. 20 is a rear perspective view of the portable wireless terminal shown in FIG. 17, which shows a rear surface of the portable wireless terminal.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0040] Hereinafter, several preferred embodiments of the present invention will be described with reference to the accompanying drawings. In the following description of the present invention, a detailed description of known functions and configurations incorporated herein will be omitted when it may make the subject matter of the present invention rather unclear.

[0041] FIG. 1 is an exploded perspective view of a rotary-type hinge module 100 of a portable wireless terminal according to a first preferred embodiment of the present invention, and FIG. 2 is a perspective view of the rotary-type hinge module 100 shown in FIG. 1. As shown in FIGS. 1 and 2, the rotary-type hinge module 100 according to the first preferred embodiment of the present invention includes a hinge housing 110, a supporting shaft 130, a rotary shaft 170, a hinge cam 150, a hinge shaft 160, and an elastic means 169 (such as a spring). The hinge cam 150, the hinge shaft 160, and the elastic means 169 are assembled with the supporting shaft 130 and received in the rotary shaft 170.

[0042] Referring to FIGS. 1 to 3, a holding pin hole 119a is formed through one end of the hinge housing 110, and a

hinge shaft hole 119b (see FIG. 3) is formed through the other end of the hinge housing 110. A portion of an inner surface of the hinge housing 110 is concave to form a fixing seat 113a on which the supporting shaft 130 is assembled. In this case, it is preferred that the fixing seat 113a has a shape other than a circular shape, so as to prevent the supporting shaft 130 (which has a matching contour to the fixing seat 113a) from rotating after being assembled on the fixing seat 113a of the hinge housing 110, and to enable the supporting shaft 130 to be securely assembled with the hinge housing 110. A fixing hole 115 is formed through a central portion of the fixing seat 113a to interconnect inner and outer sides of the hinge housing 110, so that the supporting shaft 130 can be assembled on the fixing seat 113a of the hinge housing 110 by a screw 139 screwed through the fixing hole 115 and into the end face of supporting shaft 131.

[0043] The hinge housing 110 also has an opening 111 formed through a wall opposed to the surface on which the fixing seat 113a is formed. The opening 111 provides a space, through which the supporting shaft 130 fixed on the fixing seat 113a protrudes out of the hinge housing 110, and in which the rotary shaft 170 is partially received when assembled. A sliding surface 113b is partially formed around the fixing seat 113a and has a shallower depth in inner surface of hinge housing 110 than fixing seat 113a, thereby forcing a step. The sliding surface 113b is formed along a trace corresponding to the rotating trace of the rotary shaft 170 and rotation protuberance 177 of rotary shaft 170 is received therein. Consequently, sliding surface 113b limits an angular range, within which the rotary shaft 170 can rotate, to 180°, that is, the angular expanse of sliding surface 113b. Additionally, a sliding groove 117 is formed in a semicircular shape around the opening 111, and functions similarly to the sliding surface 113b formed around the fixing seat 113a. In other words, protuberances formed at a lower end of a folder of a portable wireless terminal are inserted in and moved along the sliding groove 117, which will be described in more detail with reference to FIG. 6. In conclusion, the sliding surface 113b and the sliding groove 117 enable the folder of the portable wireless terminal to be rotated within the angular range of 180°.

[0044] The hinge housing 110 having the construction described above is rotatably assembled with a housing of a terminal body by means of the holding pin hole 119a and the hinge shaft hole 119b, so as to provide a first rotation axis A1 about which the folder is rotated when it is opened or closed.

[0045] A fixed head 131 having a shape corresponding to that of the fixing seat 113a of the hinge housing 110 is formed at one end of the supporting shaft 130, and a stepped portion 133 having an angular shape is formed circumferentially around and radially outward from the supporting shaft 130 and has a predetermined length from the fixed head 131 in a longitudinal direction along the supporting shaft 130. Further, an annular groove 135 is formed circumferentially on an outer cylindrical surface of the other end of the supporting shaft 130. The supporting shaft 130 is fixed by the screw 139 screwed through the fixing hole 115 of the hinge housing 110 as described above and provides a means with which the rotary shaft 170 together with elements contained in the rotary shaft 170 can be assembled. That is, the supporting shaft 130 provides a second rotation axis A2,